

Appendix C: SBIR/STTR and the Space Technology Roadmaps

Research and technology topics/subtopics for the SBIR Program are identified annually by Mission Directorates and Center Programs. The Directorates identify high priority research and technology needs for respective programs and projects. Research and technology topics for the STTR Program are aligned with needs associated with the research interest and core competencies across NASA Centers. Both programs support a broad range of technologies defined by a list of topics and subtopics that vary in content within each annual solicitation.

The following table relates these SBIR/STTR topics and subtopics to the Technology Area Breakdown Structure (TABS) in the Space Technology Roadmaps (STR). The table is organized by the OCT Technology Area level one (first column) and level 2 (third column), with the related SBIR Select subtopic description (fourth column) and subtopics ID (fifth column) listed as well. The Aeronautics area is included for completeness, though this is beyond the scope of the STR.

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA01	1.0.0 Launch Propulsion Systems	1.2.0 Liquid Rocket Propulsion Systems	Detailed Multiphysics Propulsion Modeling & Simulation Through Coordinated Massively Parallel Frameworks	T1.02
		1.5.0 Unconventional/Other Propulsion Systems	Small Launch Vehicle Technologies and Demonstrations	Z9.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA02	2.0.0 In-Space Propulsion Technologies	2.1.0 Chemical Propulsion	Methane In-Space Propulsion	Z10.02
		2.2.0 Non-Chemical Propulsion	Propulsion Systems for Robotic Science Missions	S3.02
			Nuclear Thermal Propulsion (NTP)	Z10.03
			Small Spacecraft Propulsion Systems	Z8.01
			Advanced Nuclear Propulsion	T2.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA03	3.0.0 Space Power and Energy Storage	3.1.0 Power Generation	Power Generation and Conversion	S3.01
			Surface Power Generation	Z1.03
		3.3.0 Power Management and Distribution	Power Electronics and Management, and Energy Storage	S3.03
			High Power, High Voltage Electronics	Z1.01
			Energy Harvesting, Transformation and Multifunctional Power Dissemination	T3.01
			Intelligent/Autonomous Electrical Power Systems	T3.02
			3.4.0 Cross Cutting Technology	Surface Energy Storage
		Small Spacecraft Power and Thermal Control		Z8.03

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA04	4.0.0 Robotics, Telerobotics and Autonomous Systems	4.1.0 Sensing & Perception	Planetary Entry, Descent and Landing and Small Body Proximity Operation Technology	S4.01
		4.2.0 Mobility	Robotic Systems - Mobility Subsystems	Z5.02
		4.3.0 Manipulation	Robotic Mobility, Manipulation and Sampling	S4.02
			Spacecraft Technology for Sample Return Missions	S4.03
		4.5.0 Autonomy	Resilient Autonomous Systems	H6.02
			Spacecraft Autonomous Agent Cognitive Architectures for Human Exploration	H6.03
			Information Technologies for Intelligent and Adaptive Space Robotics	T4.01
		4.7.0 RTA Systems Engineering	Contamination Control and Planetary Protection	S4.05
			Payload Technologies for Free-Flying Robots	Z5.01
Not Mapped	Coordination and Control of Swarms of Space Vehicles	T4.03		
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA05	5.0.0 Communication and Navigation	5.1.0 Optical Comm. And Navigation	Long Range Optical Telecommunications	H9.01
		5.2.0 Radio Frequency Communications	Intelligent Communication Systems	H9.02
			Advanced RF Communications	H9.04
			Small Spacecraft Communication Systems	Z8.02
		5.4.0 Position, Navigation, and Timing	Flight Dynamics and Navigation Technology	H9.03
			Slow and Fast Light	S3.07
		5.5.0 Integrated Technologies	Small Spacecraft Avionics and Control	Z8.05
		5.6.0 Revolutionary Concepts	Transformational/Over-the-Horizon Communications Technology	H9.05
			Terrestrial and Planetary Balloons	S3.05

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA06	6.0.0 Human Health, Life Support and Habitation Systems	6.1.0 Environmental Control Life Support & Habitation Systems	Habitat Outfitting	H3.01
			Environmental Control and Life Support	H3.03
			Logistics Reduction	H3.04
			Closed-Loop Living System for Deep-Space ECLSS with Immediate Applications for a Sustainable Planet	T6.01
		6.2.0 Extravehicular Activity Systems	Damage Tolerant Lightweight Pressure Structures	H4.01
			Small, Accurate Oxygen Compatible Gas Flow Meter for Suit Operations	H4.02
			Sensors to Measure Space Suit Interactions with the Human Body	H4.03
			Advanced Model-based Adaptive Interfaces and Augmented Reality	H12.02
		6.3.0 Human Health and Performance	Environmental Monitoring for Spacecraft Cabins	H3.02
		6.4.0 Environmental Monitoring and Safety	Radiation Shielding Technologies for Human Protection	H11.01
		6.5.0 Radiation	Radioprotectors and Mitigators of Space Radiation-induced Health Risks	H12.01
Not Mapped	Liquid Quantity Sensing Capability	T6.02		
	Modeling And Estimation Of Integrated Human-Vehicle Design Influences	T6.03		
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA07	7.0.0 Human Exploration Destination Systems	7.1.0 In-Situ Resource Utilization	Mars Atmosphere Acquisition, Separation, and Conditioning for ISRU	H1.01
			Mars Soil Acquisition and Processing for In Situ Water	H1.02
			Lunar Resources	H2.01
			ISS Utilization and Microgravity Research	H8.01
			Regolith Resources Robotics - R ³	T4.02
			Advanced Bioreactor Development for In Situ Microbial Manufacturing	T7.01
		7.2.0 Sustainability & Supportability	Space Exploration Plant Growth	T7.02

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA08	8.0.0 Science Instruments, Observatories & Sensor Systems	8.1.0 Science Instruments	Lidar Remote Sensing Technologies	S1.01
			Particles and Field Sensors and Instrument Enabling Technologies	S1.06
			In Situ Instruments/Technologies for Planetary Science	S1.07
			Surface & Sub-surface Measurement Systems	S1.08
			Atomic Interferometry	S1.10
			In Situ Instruments/Technologies for Ocean Worlds Life Detection	S1.11
			Sample Processing For Life Detection Investigations for Ocean Worlds	S1.12
			Command, Data Handling, and Electronics	S3.08
			Sample Collection For Life Detection in Outer Solar System Ocean World Plumes	S4.06
			Technologies for Planetary Compositional Analysis and Mapping	T8.01
		8.2.0 Observations	Proximity Glare Suppression for Astronomical Coronagraphy	S2.01
			Precision Deployable Optical Structures and Metrology	S2.02
			Advanced Optical Systems and Fabrication/Testing/Control Technologies for EUV/Optical and IR Telescope	S2.03
			X-Ray Mirror Systems Technology, Coating Technology for X-Ray-UV-OIR, and Free-Form Optics	S2.04
		8.3.0 Sensor Systems	Technologies for Active Microwave Remote Sensing	S1.02
			Technologies for Passive Microwave Remote Sensing	S1.03
			Sensor and Detector Technology for Visible, IR, Far IR and Submillimeter	S1.04
			Detector Technologies for UV, X-Ray, Gamma-Ray and Cosmic-Ray Instruments	S1.05
			Cryogenic Systems for Sensors and Detectors	S1.09
			Guidance, Navigation and Control	S3.04
			Extreme Environments Technology	S4.04
Integrated Science Mission Modeling	S5.04			

TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA09	9.0.0 Entry, Descent and Landing Systems	9.1.0 Aeroassist & Entry	Deployable 3D Woven Thermal Protection Materials	Z7.02
			Deployable Aerodynamic Decelerator Technology	Z7.03
		9.2.0 Descent	Supersonic Parachute Inflation Materials Testing, And Instrumentation	Z7.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA11	11.0.0 Modeling, Simulation, Information Technology and Processing	11.1.0 Computing	Technologies for Large-Scale Numerical Simulation	S5.01
			High Performance Space Computing Technology	Z6.01
		11.2.0 Modeling	Enabling NASA Science through Large-Scale Data Processing and Analysis	S5.03
			Distributed Spacecraft Missions (DSM) Technology Framework	T11.02
		11.4.0 Information Processing	Integrated System Health Management for Sustainable Habitats	H6.01
			Earth Science Applied Research and Decision Support	S5.02
Not Mapped	Machine Learning and Data Mining for Autonomy, Health Management, and Science	T11.01		
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA12	12.0.0 Materials, Structures, Mechanical Systems and Manufacturing	12.1.0 Materials	Advanced Metallic Materials and Processes Innovation	Z3.02
			Thin-Ply Composites Design Technology and Applications	T12.03
		12.2.0 Structures	Mars Surface Solar Array Structures	H5.01
			Advanced Structural Health Monitoring	T12.01
		12.4.0 Manufacturing	In-Space Manufacturing of Electronics and Avionics	H7.01
			In-Space Manufacturing of Precision Parts	H7.02
			In-Situ Sensing of Additive Manufacturing Processes for Safety-Critical Aerospace Applications	Z3.01
		12.5.0 Cross-Cutting	Flight Test and Measurements Technologies	A2.01
			NDE Sensors	Z11.01
			NDE Simulation and Analysis	Z11.02
In-Space Structural Assembly and Construction	Z4.01			

			Small Spacecraft Structures, Mechanisms, and Manufacturing	Z8.04
		Not Mapped	Technologies to Enable Novel Composite Repair Methods	T12.02
			Structural Efficiency-Tailored Airframe & Structures	A1.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA13	13.0.0 Ground and Launch Systems Processing	13.1.0 Technologies to Optimize the Operational Life-Cycle	Advanced Propulsion Systems Ground Test Technology	H10.01
		13.3.0 Technologies to Increase Reliability and Mission Availability	Improved Operations via Interface Design	H10.02
			Cryogenic Purge Gas Recovery and Reclamation	H10.03
			Real Time Launch Environment Modeling and Sensing Technologies	T1.03
			Intelligent Sensor Systems	T13.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA14	14.0.0 Thermal Management Systems	14.1.0 Cryogenic Systems	Cryogenic Fluid Management	Z10.01
		14.2.0 Thermal Control Systems	Thermal Control Systems	S3.06
			Thermal Management	Z2.01
TA	STR Technology Area (TA) Level 1 Description	STR Technology Area (TA) Level 2 Description	Subtopic Description	Subtopic
TA15	15.0.0 Aeronautics	15.3.0 Ultra-Efficient Commercial Vehicles	Quiet Performance - Airframe Noise Reduction	A1.02
			Aerodynamic Efficiency-Active Flow Control Actuators and Design Tools	A1.04
			Computational Methods & Tools - High Fidelity Mesh and Geometry Tools	A1.05
			Vertical Lift Technology	A1.06
			Bio-inspired and Biomimetic Technologies and Processes for Earth and Space	T15.02
		15.4.0 Transition to Low-Carbon Propulsion	Low Emissions Propulsion and Power-Turboelectric and Hybrid Electric Aircraft Propulsion	A1.03
			Distributed Electric Propulsion Aircraft Research	T15.01
		15.5.0 Real-Time System-Wide Safety Assurance	Vehicle Safety- Internal Situational Awareness and Response	A1.09
		Not Mapped	Aeronautics Ground Test and Measurements Technologies	A1.08
			Hypersonic Technology-Improvement in Solar Operability Predictions using Computational Algorithms	A1.10